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On Colombian *Cryptocellus* (Arachnida, Ricinulei)

NORMAN I. PLATNICK¹ AND MOHAMMAD U. SHADAB²

ABSTRACT

The female of *Cryptocellus magnus* Ewing is redescribed and the male is described for the first time. *Cryptocellus manni* Ewing is shown to be based on a deutonymph of *C. magnus* and is newly synonymized with that species. The female allotype of *Cryptocellus glenoides* Cooke and Shadab is transferred to *Cryptocellus*

isthmus Cooke and Shadab, and a specimen believed to represent the actual female of *C. glenoides* is described. Scanning electron micrographs show that the surface of the "ocelli" of ricinuleids is coated with cuticular projections and that the "ocelli" cannot function as lenses.

INTRODUCTION

In recent years, thanks to the success of Pittard and Mitchell (1972) in tracing the morphological changes involved in the maturation of *Cryptocellus pelaezi* and the discovery by Brignoli (1974) of diagnostic spermathecae in adult females, our knowledge of the systematics of the rare arachnid order Ricinulei has advanced by several orders of magnitude. It is now possible to identify reliably mature females as well as males, and to demonstrate that several previously described species were based exclusively on juvenile material and must therefore be considered *nomina dubia* unless and until topotypical or near topotypical adult specimens become available.

Three species of *Cryptocellus* have been described from Colombia. Ewing (1929) described

Cryptocellus magnus and *Cryptocellus manni* on the basis of single specimens collected at Cincinnati, Colombia; this locality (latitude 11°06' N, longitude 74°06' W) is at an elevation of approximately 1480 m. in the Sierra Nevada de Santa Marta, an isolated mountain range in Magdalena Department, northern Colombia. From Ewing's descriptions, it is possible to determine that although the former species was based on an adult female, the latter name was attached to a nymph; the preanal setae (fig. 10) described by Ewing as occurring on the second pygidial segment of *C. manni* are now known to occur only in juveniles (Pittard and Mitchell, 1972). Little other information can be obtained from these descriptions, however; after listing the known American ricinuleids Beck and Schubart (1968) were com-

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pelled to add that "Von diesen Arten ist *C. magnus* so unzulänglich beschrieben, dass er nur auf Grund seiner Körpergrösse von den übrigen Arten getrennt werden kann."

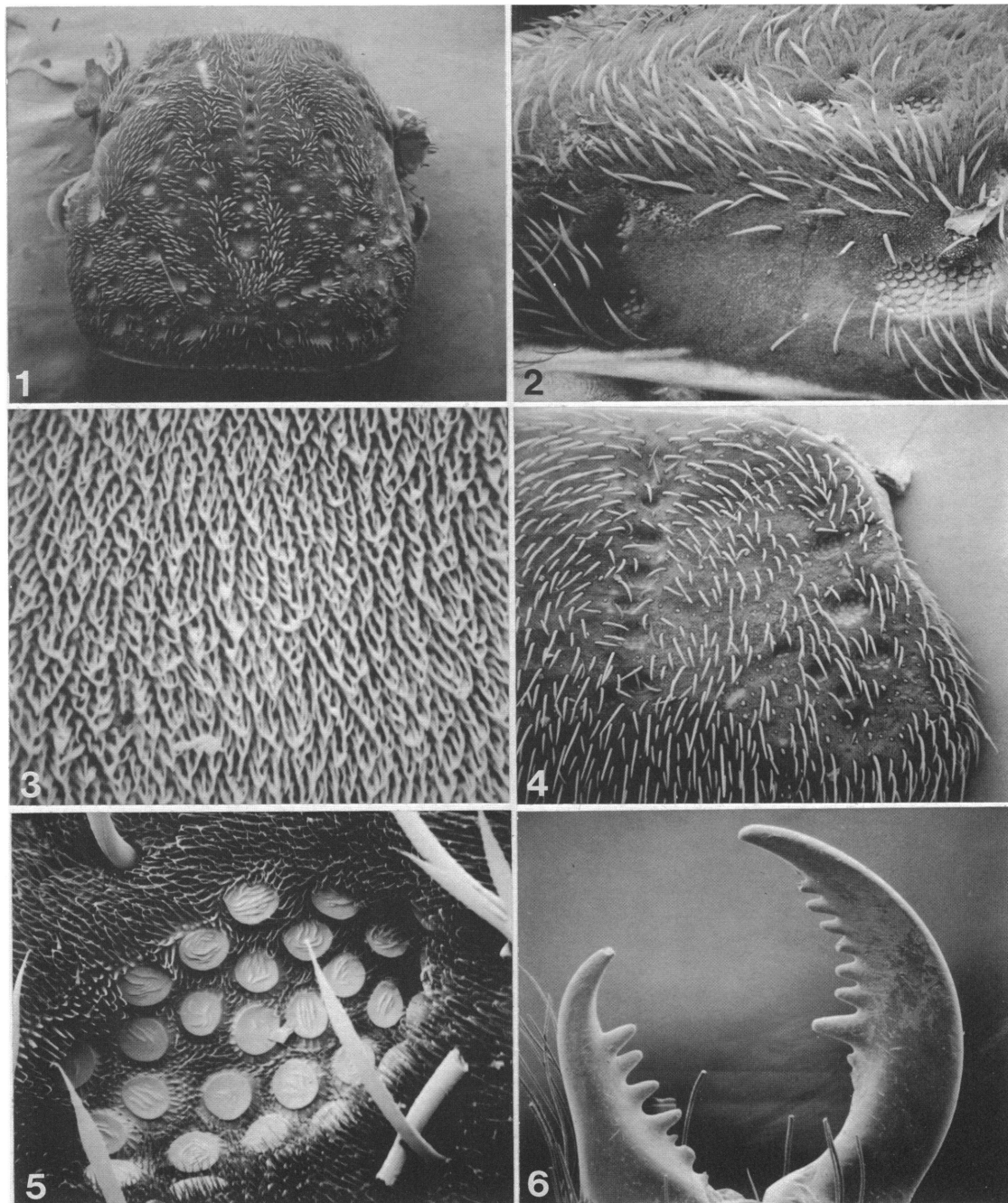
Through the courtesy of Mr. John A. Kochalka of the University of Vermont, we have recently had the opportunity to examine a series of ricinuleids captured in the Sierra Nevada de Santa Marta. This material was collected at two sites within 20 km. of Cincinati and includes all the life stages. The holotype of *C. magnus*, long thought to be lost, was located in the National Museum of Natural History by Dr. Ralph E. Crabill, Jr.; the specimen had been pinned dry but has been restored in alcohol and is now in good condition. The large size, the presence and arrangement of the peculiar cuticular pits (figs. 1, 2, 4, 5) described by Ewing, and especially the structure of the spermathecae (fig. 14) allow assignment of the new material to *C. magnus*. The holotype of *C. manni* was also available for examination; the tarsomere formula (1544) indicates that the specimen is a deutonymph, and it corresponds well with deutonymphs from the present material, particularly in the number and arrangement of tubercles on the carapace and second tarsus (Ewing, 1929, figs. 2, 8). It is thus possible to synonymize *C. manni* with *C. magnus* and to offer a redescription of the female and the first description of the male of the species.

The new specimens were all found under rotten logs at relatively low elevations; one locality was in a steeply sloping coffee plantation, the other in dense undisturbed jungle on the steeply sloping side of a valley. The relative abundance of specimens has allowed investigation by scanning electron microscopy. The cuticle, which appears smooth under ordinary magnifications, is completely coated with tiny seta-like projections much smaller than the actual setae (figs. 5, 7). Like many other ricinuleids, *C. magnus* bears at the sides of the carapace areas that lack setae and that are much lighter in coloration than the remainder of the carapace (fig. 2); these areas were termed "ocelli" by Cooke and Shadab (1973), but their surface is also covered with tiny projections (fig. 3) and the ocelli cannot function as lenses. The statement by those authors that "ocelli are wholly absent in the known troglotic Ricinulei but apparently widespread in epigeal species" is incorrect; all three troglotic

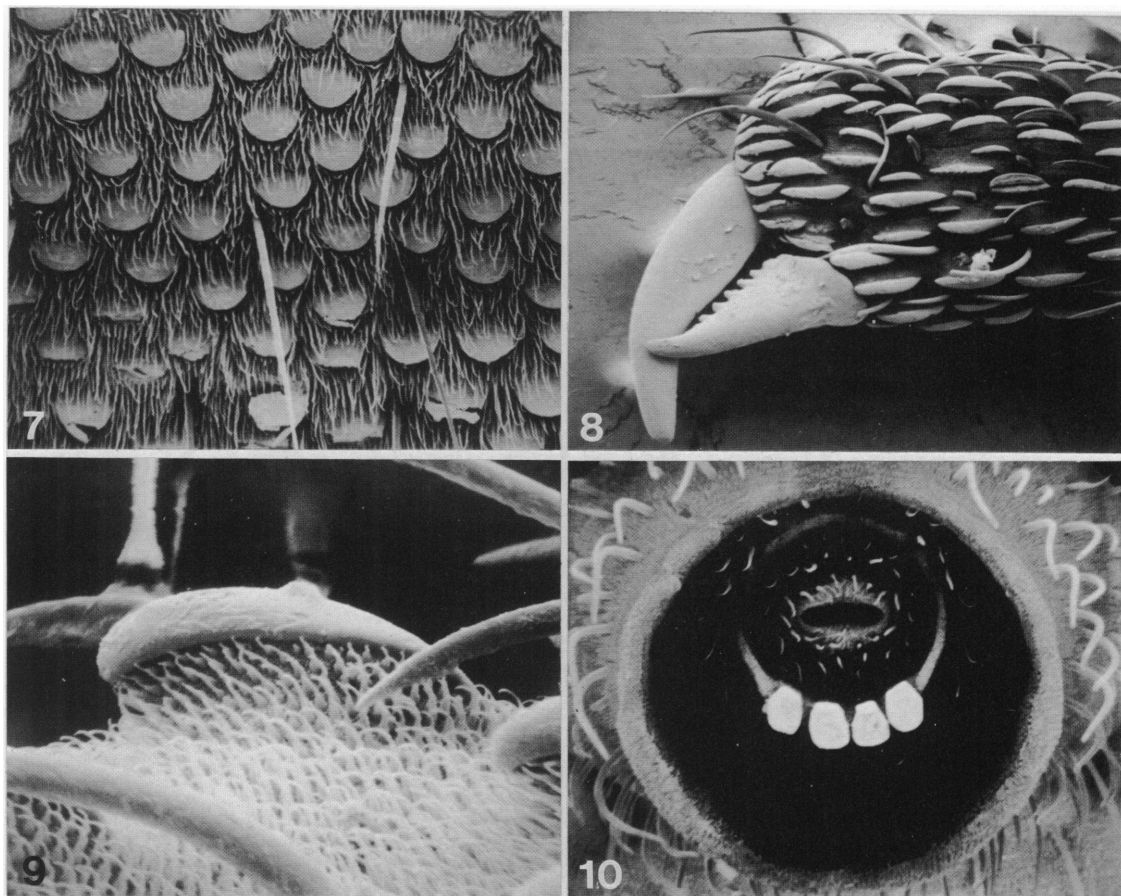
species described by Gertsch (1971) have the pale areas clearly described and illustrated. Of interest also is the presence in *C. magnus* of elongated, elevated tubercles on the palpal tibia (figs. 8, 9) similar to those described in African *Ricinoides* by Tuxen (1974).

Cooke and Shadab (1973) described a third species, *Cryptocellus glenoides*, from a male collected in a lowland rainforest in Valle Department, southwestern Colombia; *C. glenoides* and *C. magnus* differ from the other species in the genus by having extremely long, thick, and straight accessory pieces of the male copulatory apparatus (figs. 13, 15; Cooke and Shadab, 1973, fig. 37); this seems to be a synapomorphy and the two taxa sister species. Cooke and Shadab associated with *C. glenoides* a female from Panama Province, Panama, that differs from the male in a number of important characters: the median furrow of the carapace has tubercles that are lacking in the male, the midline suture of coxae II is longer than (rather than subequal to) that of coxae III and IV, the abdomen lacks the numerous long, fine setae found in the male, and, most importantly, the proximal leg segments completely lack tubercles (those of the male are evenly coated with numerous tubercles). The Museum of Comparative Zoology houses a female collected less than 20 km. from the type locality of *C. glenoides*, in an ecologically similar area, that corresponds to the male in all the characters mentioned. In addition, the spermathecae seem to be closest to those of *C. magnus*, being anteriorly flattened in both cases; this specimen is described below and considered to be the true female of *C. glenoides*. The presence of two spermathecae rather than four, as correctly figured for the Mexican species examined by Brignoli (1974), is not an autapomorphy, as all the Central and South American species we have thus far examined have only two; the anterior flattening of the spermathecae in *C. magnus* and *C. glenoides* may well be synapomorphic, however, as these structures are rounded anteriorly in all the other species examined.

The Panamanian female placed with *C. glenoides* by Cooke and Shadab has spermathecae quite different from those of the female here assigned to the species (compare figs. 16 and 17). In each of the somatic characters listed above, the Panamanian female resembles the male holo-



FIGS. 1-6. *Cryptocellus magnus* Ewing, adult female. 1. Carapace, dorsal view, 28X. 2. Carapace, translucent area, lateral view, 100X. 3. Surface of translucent area, lateral view, 1300X. 4. Cucullus, anterior view, 65X. 5. Pit from cucullus, anterior view, 675X. 6. Left chelicera, posterior view, 110X.

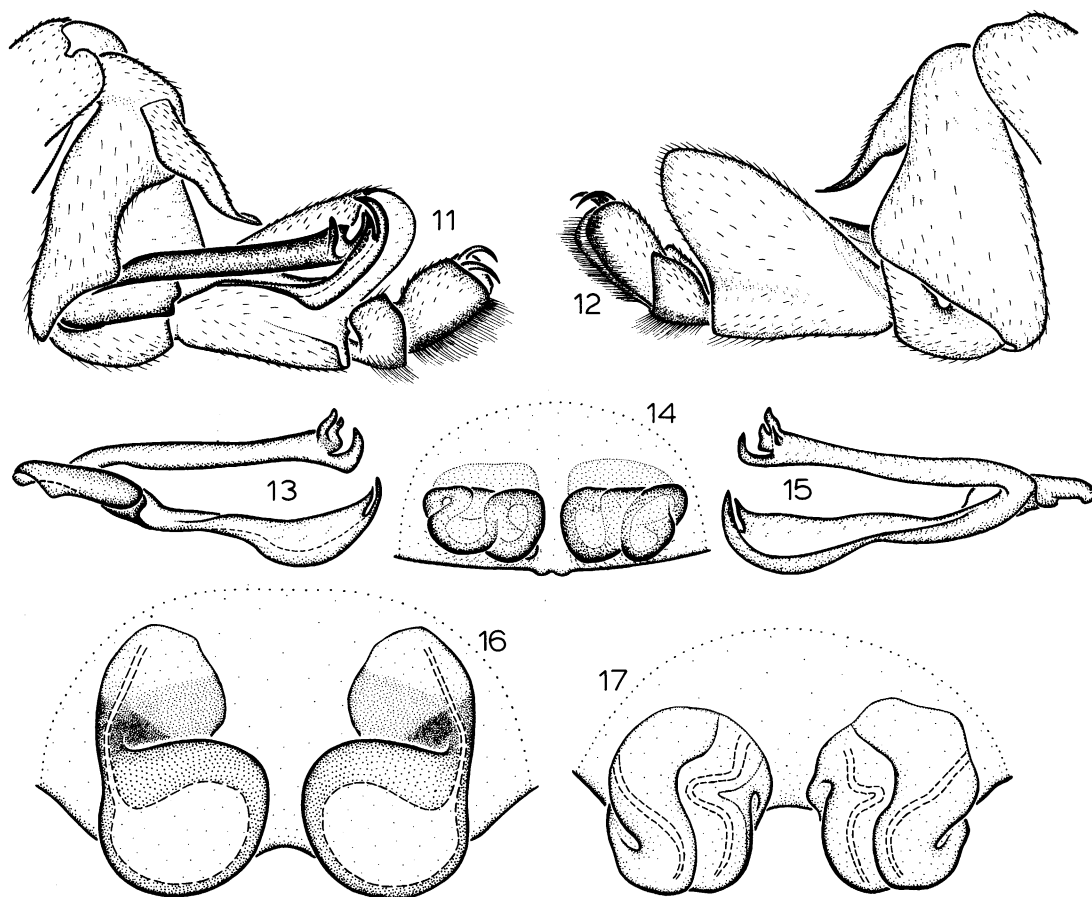


FIGS. 7-10. *Cryptocellus magnus* Ewing. 7-9. Adult female. 7. Tubercles on anterior ridge of abdomen, dorsal view, 500 \times . 8. Distal end of palpal tibia, lateral view, 200 \times . 9. Elevated tubercle from palpal tibia, lateral view, 2000 \times . 10. Deutonymph, pygidium showing four preanal setae, posterior view, 220 \times .

type of *Cryptocellus isthmus* Cooke and Shadab, described from the Canal Zone, and the specimen is here assigned to that species. The absence of tubercles on the proximal leg segments in both specimens strongly supports a hypothesis of conspecificity; the only character found that argues against that possibility is coloration; the male is considerably lighter than the female. This could be the result of the male being captured and preserved soon after it matured, before sclerotization of the adult cuticle was complete; the male holotype of *Cryptocellus striatipes* Cooke and Shadab may represent a similar case, as nymphs of many species show the dorsal longitudinal leg stripes found in that specimen. Incompletely

sclerotized adults are collected fairly frequently in spiders; the likelihood of finding such specimens may be much higher in Ricinulei because of their extremely slow rate of development (R. W. Mitchell, personal commun.).

We are indebted to Mr. J. A. Kochalka and to Drs. R. E. Crabill, Jr., of the National Museum of Natural History, Smithsonian Institution, and H. W. Levi of the Museum of Comparative Zoology, Harvard University, for the loan of specimens, to Dr. Willis J. Gertsch for helpful advice and copies of manuscripts in press, and to Mr. Robert J. Koestler for assistance with the scanning electron microscope.



FIGS. 11-17. 11-15. *Cryptocellus magnus* Ewing. 11. Male leg III, anterior view. 12. Male leg III, posterior view. 13. Male copulatory apparatus, anterior view. 14. Spermathecae, posterior view. 15. Male copulatory apparatus, posterior view. 16. *C. isthmius* Cooke and Shadab, spermathecae, posterior view. 17. *C. glenoides* Cooke and Shadab, spermathecae, posterior view.

Cryptocellus magnus Ewing

Figures 1-15

Cryptocellus magnus Ewing, 1929, p. 589, fig. 1 (female holotype from Cincinati, Magdalena, Colombia, in National Museum of Natural History, examined).

Cryptocellus manni Ewing, 1929, p. 591, figs. 2, 5, 8 (deutonymph holotype from Cincinati, Magdalena, Colombia, in National Museum of Natural History, examined). NEW SYNONYMY.

Diagnosis. *Cryptocellus magnus* is closest to *C. glenoides* but may be distinguished by the presence of deep pits on the cucullus, carapace and

abdomen (figs. 1, 4), the trifold accessory piece of the male copulatory apparatus (figs. 13, 15), and the shape of the spermathecae (fig. 14).

Female. Total length 7.74 mm. Carapace 2.53 mm. long, 2.38 mm. wide between legs II and III, where widest, dark red at front, sides, and back, lighter medially, with translucent yellow areas opposite second trochanters (figs. 2, 3); surface evenly coated with short, white setae, without tubercles, with deep pits arranged as follows: median longitudinal row of about 13 becoming deeper posteriorly; marginal rows of four anterior and four posterior at sides, and four on each side of posterior margin; long submarginal U-shaped row of two anterior widely separated

from nine posterior on each side; short paramedian V-shaped rows of four on each side at center between longitudinal and submarginal rows (fig. 1). Cucullus 1.17 mm. long, 1.75 mm. wide, dark red, with white setae becoming longer distally, five tubercles at center of distal margin, median longitudinal and paired, outwardly curved lateral rows of six or seven deep pits (fig. 5), and slightly protuberant lateral lobes (fig. 4). Left chelicera (fig. 6): movable finger laterally thin, not transversely widened, armed with nine teeth of which two most proximal are reduced to tiny denticles, third most proximal greatly elongated, and remainder decreasing in length distally; fixed finger armed with seven teeth of which three most proximal are shortest, second most proximal greatly widened, and four most distal subequal in length. Sternal region with coxae I meeting tritosternum with median edge rather than sharp point; coxae II meeting along their posterior six-sevenths, their suture line about twice as long as that of coxae III; coxae IV not meeting. Abdomen 4.79 mm. long, 3.38 mm. wide near front of tergite 12, where widest, coloration and setation as in carapace except for brownish orange articular membranes, with tubercles only along anterior margins of sternites 10 and 11 and in wide transverse band on anterior ridge of tergite 9 (fig. 7), with deep pits arranged as follows: tergite 10, median plate none, lateral plates one at middle of inner margin; tergite 11, median plate 11 along anterior margin (middle three separated from others), seven along posterior margin, lateral plates five along inner margin; tergite 12, median plate five on each side along anterior margin, three on each side along posterior margin, lateral plates four along inner margin; tergite 13, median plate two on each side along anterior margin, about six scattered posteriorly, lateral plates four along inner margin; median plates of tergites 11-13 with outwardly curved longitudinal depressions along lateral margins, corresponding sternites with similar depressions; median plates of tergites 11 and 12 wider than long, of tergite 13 longer than wide. Pygidium without notch in posterior dorsal margin of basal segment. Pedipalpal coxae, second trochanters, and tibiae red, first trochanters and femora dark orange; coxae and trochanters with scattered dorsal and ventral tubercles; coxae each with two thick white setae posteri-

only along inner margin; distal half of tibiae covered with elongate, elevated tubercles (figs. 8, 9). Leg formula 2431. Legs dark red, lightest distally, coated with short, white setae; coxae with very few ventral tubercles along inner margin; metatarsi and tarsi with scattered dorsal and ventral tubercles. Measurements in mm.:

	I	II	III	IV	Palp
Coxa	0.97	1.37	1.19	0.94	0.50
Trochanter I	0.61	0.75	0.65	0.72	0.63
Trochanter II	—	—	0.78	0.73	0.47
Femur	1.51	2.70	1.69	1.92	1.19
Patella	0.84	1.22	0.97	0.94	—
Tibia	0.94	1.89	0.98	1.08	1.87
Metatarsus	1.33	2.16	1.30	1.33	—
Tarsus	<u>0.52</u>	<u>2.08</u>	<u>0.82</u>	<u>1.19</u>	<u>0.23</u>
Total	6.72	12.17	8.38	8.85	4.89

Second legs not widened; femur I about three times as long as wide, femur II about four and one-half times as long as wide. Tarsal claws thin, evenly curved. Spermathecae as in figure 14.

Male. As in female except for the following: total length 7.42 mm. Carapace 2.57 mm. long, 2.45 mm. wide. Cucullus 1.26 mm. long, 1.81 mm. wide. Left chelicera with reduced dentition, movable finger armed with eight teeth of which most proximal is largest and five most distal reduced to flattened lobes, fixed finger armed with six teeth of which most proximal is shortest, most distal longest, and others subequal. Abdomen 4.84 mm. long, 2.90 mm. wide; tergite 11, median plate six pits on each side along anterior margin, posterior row advanced from posterior margin; tergite 12, median plate posterior pit row advanced; tergite 13, median plates three pits on each side along anterior margin. Leg formula 2341. Coxae II and III with median transverse row of about five tubercles. Measurements in mm.:

	I	II	III	IV	Palp
Coxa	0.90	1.42	1.24	0.90	0.47
Trochanter I	0.72	0.93	0.61	0.78	0.61
Trochanter II	—	—	0.83	1.22	0.53
Femur	1.62	3.10	1.94	2.05	1.22
Patella	0.97	1.55	1.12	1.15	—
Tibia	1.19	2.42	1.16	1.49	1.69
Metatarsus	1.37	2.64	1.48	1.30	—
Tarsus	<u>0.56</u>	<u>1.73</u>	<u>1.98</u>	<u>1.15</u>	<u>0.22</u>
Total	7.33	13.79	10.36	10.04	4.74

Second leg without sexual modifications. Copulatory apparatus with trifid accessory piece and bifid body (figs. 11-13, 15).

Material Examined. Colombia: *Magdalena*: Sierra Nevada de Santa Marta: San Pedro, elevation 960 m., May 19, 1975, 1 larva, 1 protonymph, 7 deutonymphs, 2 ♀ tritonymphs, 1 ♂ tritonymph, 6 ♀ adults (J. A. Kochalka); *Villa Leonor*, Serranía Nueva Granada, elevation 1311 m., April 12, 1975, 3 ♀ adults, 1 ♂ adult (J. A. Kochalka). One specimen of each life stage is deposited in the American Museum of Natural History, the remainder of the material in Mr. Kochalka's private collection.

Synonymy. Reasons for the new synonymy are provided in the Introduction.

Note: One of the deutonymphs is teratological, bearing the normal five tarsomeres on the right leg II but only two tarsomeres on the left leg II.

Cryptocellus glenoides Cooke and Shadab

Figure 17

Cryptocellus glenoides Cooke and Shadab, 1973, p. 12, figs. 4, 20, 27, 28, 31, 37 (male holotype from 5 km. W of Delfina, Valle, Colombia, in the American Museum of Natural History, examined; not figs. 5, 15, female allotype from Cerro Campana, Panama, Panama, in the Museum of Comparative Zoology, examined, here transferred to *Cryptocellus isthmus* Cooke and Shadab).

Diagnosis. *Cryptocellus glenoides* is closest to *C. magnus* but may be distinguished by the absence of cuticular pits, the bifid accessory piece of the male copulatory apparatus (Cooke and Shadab, 1973, fig. 37), and the shape of the spermathecae (fig. 17).

Female. Total length 5.11 mm. Carapace 1.73 mm. long, 2.04 mm. wide between legs II and III, where widest, dark red at front and sides, lighter medially and posteriorly, with pale translucent areas opposite margins between trochanters I and II; surface with scattered white, very long, fine setae concentrated on lateral margins, without tubercles, with deep median furrow and pair of short oblique lateral furrows opposite second legs. Cucullus 0.96 mm. long, 1.17 mm. wide, dark red with lighter submarginal band, with extremely long, fine, white setae and tubercles scattered along margins, without projecting lateral

lobes, only slightly narrowed dorsally. Left chelicera: movable finger laterally thin, not transversely widened, armed with 12 teeth of which two most proximal are reduced to denticles, others subequal in length; fixed finger armed with five teeth of which distal one is much the largest. Sternal region with coxae I not meeting tritosternum; coxae II meeting along their posterior four-fifths, their suture line only slightly longer than that of coxae III; coxae IV not meeting. Abdomen 3.35 mm. long, 2.74 mm. wide at middle of tergite 12, where widest, coloration as in carapace except for brownish orange articular membranes, coated with numerous long, fine setae, with tubercles in rows along posterior margin of median plate of tergite 10, anterior and posterior margins of tergites 11-13, and in wide transverse band on anterior ridge of tergite 9; median plates of tergites 11-13 with excavate lateral depressions, lateral plates with shallow depressions along inside border; sternites without tubercles, with paramedian excavate depressions; median plates of tergites 11-13 wider than long. Pygidium without notch in posterior dorsal margin of basal segment. Pedipalpal coxae red, trochanters dark orange, distal segments orange; coxae, trochanters, and femora with ventral tubercles; all segments with numerous long, white setae; tibiae without elevated tubercles. Leg formula 2431. Legs dark red proximally, grading to orange on metatarsi and tarsi; all segments fringed with long, white setae and rather evenly coated with small tubercles. Measurements in mm.:

	I	II	III	IV	Palp
Coxa	0.83	1.09	0.90	0.94	0.47
Trochanter I	0.54	0.79	0.64	0.73	0.58
Trochanter II	—	—	0.58	0.61	0.30
Femur	1.58	2.05	1.44	1.57	0.90
Patella	0.68	1.06	0.75	0.77	—
Tibia	0.90	1.62	0.94	1.01	1.48
Metatarsus	1.18	1.69	0.97	1.12	—
Tarsus	<u>0.50</u>	<u>1.78</u>	<u>0.86</u>	<u>1.01</u>	<u>0.22</u>
Total	6.21	10.08	7.08	7.76	3.95

Second legs not widened; femur I almost three and one-half times as long as wide, femur II about four times as long as wide. Tarsal claws thin, evenly curved. Spermathecae as in figure 17.

Male. Described by Cooke and Shadab (1973).

Material Examined. Colombia: *Valle del Cauca*: lowland rainforest at Bajo Calima, Municipio Buenaventura, March 16-17, 1967, 1 ♀ adult (R. B. Root, W. L. Brown), deposited in the Museum of Comparative Zoology, Harvard University.

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